IN THE CLAIMS:

Please amend the claims as follows:

1.   (Currently Amended) A method for hitless switch management module failover, the method comprising:

(a)   at a first switch management module in a switch, operating in a master mode, wherein operating in the master mode includes:

(i)   performing packet forwarding and participating in network protocols;

(ii)   maintaining packet forwarding and protocol state information based on step (i); and

(iii)   communicating the packet forwarding and protocol state information to a second switch management module operating in a slave mode, wherein the packet forwarding and protocol state information is associated with a state in which the first switch management module last operated correctly; and

(b)   at the second switch management module in the switch, operating in the slave mode, wherein operating in the slave mode includes:

(i)   continuously monitoring the operational state of the first switch management module;

(ii)   receiving the packet forwarding and protocol state information from the first switch management module; and

(iii) in response to detecting failure of the first switch management module, switching to the master mode and resuming network protocol operation from the state in which the first switch management module last operated correctly ~~based on~~ by injecting the received packet forwarding and protocol state information into one or more subsystems of the second switch management module associated with performing packet forwarding and participating in network protocols.

2. (Original) The method of claim 1 wherein performing packet forwarding includes performing at least one of layer 2 and layer 3 packet forwarding.

3. (Original) The method of claim 1 wherein participating in network protocol includes participating in at least one of layer 2 and layer 3 network protocols.

4. (Original) The method of claim 3 wherein participating in layer 2 network protocols includes participating in a spanning tree protocol.

5. (Original) The method of claim 1 wherein maintaining packet forwarding information includes maintaining layer 2 packet forwarding tables.

6. (Original) The method of claim 1 wherein storing protocol state information includes storing layer 2 protocol state information.

7. (Currently Amended) A method for hitless switch management module failover, the method comprising:

(a) at a first switch management module in a switch, operating in a master mode, wherein operating in the master mode includes:

(j)   performing packet forwarding and participating in network protocols;

(ii)   maintaining packet forwarding and protocol state information based on step (i) wherein maintaining packet forwarding information includes maintaining layer 2 spanning tree protocol information; and

(iii)   communicating the packet forwarding and protocol state information to a second switch management module operating in a slave mode; and

(b)   at the second switch management module in the switch, operating in the slave mode, wherein operating in the slave mode includes:

(j)   continuously monitoring the operational state of the first switch management module;

(ii)   receiving the packet forwarding and protocol state information from the first switch management module; and

(iii)   in response to detecting failure of the first switch management module, switching to the master mode and resuming network protocol operation from a state in which the first switch management module last operated correctly ~~based on~~ <u>by injecting</u> the received packet forwarding and protocol state information <u>into one or more subsystems of the second switch management module associated with performing packet forwarding and participating in network protocols</u>.

8. (Currently Amended) A method for hitless switch management module failover, the method comprising:

(a) at a first switch management module in a switch, operating in a master mode, wherein operating in the master mode includes:

(k) performing packet forwarding and participating in network protocols;

(ii) maintaining packet forwarding and protocol state information based on step (i); and

(iii) communicating the packet forwarding and protocol state information to a second switch management module operating in a slave mode using a canonical message format, wherein the canonical message format is a message format that corresponds to message type and length rules stored by the master and slave switch management modules; and

(b) at the second switch management module in the switch, operating in the slave mode, wherein operating in the slave mode includes:

(k) continuously monitoring the operational state of the first switch management module;

(ii) receiving the packet forwarding and protocol state information from the first switch management module; and

(iii) in response to detecting failure of the first switch management module, switching to the master mode and resuming network

protocol operation from a state in which the first switch management module last operated correctly based on the received packet forwarding and protocol state information.

9. (Previously Presented) The method of claim 8 wherein using the canonical message format includes sending data structures in messages in which fields are decodable by the second switch management module independently of the order in which the fields are placed in the messages.

10. (Previously Presented) The method of claim 8 wherein using the canonical message format includes defining messages types, lengths, and values recognizable by the first and second switch management modules and formatting messages sent from the first switch management module to the second switch management module utilizing the types, lengths, and values.

11. (Original) The method of claim 10 comprising communicating a first data structure from the first switch management module to the second switch management module utilizing the types, lengths, and values, wherein the second switch management module includes a second data structure that has different fields from the first data structure, and wherein the second switch management modules uses the types, lengths, and values to update fields in the second data structure corresponding to fields in the first data structure.

12. (Original) The method of claim 11 wherein the second switch management module sets fields in the second data structure that do not correspond to fields in the first data structure to default values.

13.   (Original)   The method of claim 1 wherein communicating the protocol state information to the second switch management module includes communicating the protocol state information in response to changes in the protocol state information.

14.   (Currently Amended)   A method for hitless switch management module failover, the method comprising:

(a)   at a first switch management module in a switch, operating in a master mode, wherein operating in the master mode includes:

   (i)   performing packet forwarding and participating in network protocols;

   (ii)   maintaining packet forwarding and protocol state information based on step (i); and

   (iii)   communicating the packet forwarding and protocol state information to a second switch management module operating in a slave mode using bracketing to group related messages together, wherein using bracketing to group related messages together includes grouping all messages received between an open bracket and a closed bracket as part of a single transaction; and

(b)   at the second switch management module in the switch, operating in the slave mode, wherein operating in the slave mode includes:

   (i)   continuously monitoring the operational state of the first switch management module;

(ii)   receiving the packet forwarding and protocol state information from the first switch management module; and

(iii)   in response to detecting failure of the first switch management module, switching to the master mode and resuming network protocol operation from a state in which the first switch management module last operated correctly based on the received packet forwarding and protocol state information.

15.   (Original)   The method of claim 14 wherein using bracketing includes, at the second switch management module, in response to receiving an open bracket, and storing messages received after the open bracket.

16.   (Original)   The method of claim 15 comprising, at the second switch management module, in response to detecting failure of the first switch management module and failing to receive a close bracket, discarding messages received since the open bracket.

17.   (Original)   The method of claim 15 comprising, in response to receiving a close bracket, processing messages received since the open bracket and updating corresponding protocol state and packet forwarding information.

18.   (Currently Amended)   A method for hitless switch management module failover, the method comprising:

(a)   at a first switch management module in a switch, operating in a master mode, wherein operating in the master mode includes:

(j)   performing packet forwarding and participating in network protocols;

(ii)   maintaining packet forwarding and protocol state information based on step (i); and

(iii)   communicating the packet forwarding and protocol state information to a second switch management module operating in a slave mode using bracketing to group related messages together, <u>wherein using bracketing to group related messages together includes grouping all messages received between an open bracket and a closed bracket as part of a single transaction</u>; and

(b)   at the second switch management module in the switch, operating in the slave mode, wherein operating in the slave mode includes:

(i)   continuously monitoring the operational state of the first switch management module;

(ii)   receiving the packet forwarding and protocol state information from the first switch management module;

(iii)   in response to detecting failure of the first switch management module, switching to the master mode and resuming network protocol operation from a state in which the first switch management module last operated correctly based on the received packet forwarding and protocol state information; and

(iv)   after switching to the master mode, detecting non-hitless operation and a cause for the non-hitless operation, and communicating the cause to the first switch management module.

19.   (Currently Amended) A method for hitless software upgrade or downgrade in a switched network element, the method comprising:

(a)   operating a first switch management module in the switched network element in a master mode, wherein operating in the master mode includes forwarding packets and participating in network protocols using a first software version;

(b)   operating a second switch management module in a slave mode, wherein operating in the slave mode includes monitoring the operational state of the first switch management module using the first software version;

(c)   storing a second software version in memory;

(d)   rebooting the second switch management module using the second software version;

(e)   distributing protocol state and packet forwarding information from the first switch management module executing the first software version to the second switch management module executing the second software version; and

(f)   at the second switch management module, switching from operating in the slave mode to the master mode, wherein operating in the master mode includes injecting the protocol state and packet forwarding information

received from the first switch management module into one or more subsystems of the second switch management module associated with performing packet forwarding and participating in network protocols and starting packet forwarding and network protocol operations using the protocol state and packet forwarding information received from the first switch management module, thereby starting from the last correct network protocol operational state of the first switch management module.

20. (Original) The method of claim 19 where operating the first switch management module in the master mode includes performing layer 2 packet forwarding operations.

21. (Original) The method of claim 19 wherein participating in network protocols using a first software version includes participating in layer 2 network protocols.

22. (Original) The method of claim 21 wherein participating in layer 2 network protocols includes participating in a spanning tree protocol.

23. (Original) The method of claim 19 wherein operating the second switch management module in the slave mode includes storing the packet forwarding and protocol state information received from the first switch management module.

24. (Currently Amended) A method for hitless software upgrade or downgrade in a switched network element, the method comprising:

(a) operating a first switch management module in the switched network element in a master mode, wherein operating in the master mode includes

forwarding packets and participating in network protocols using a first software version;

(b)   operating a second switch management module in a slave mode, wherein operating in the slave mode includes monitoring the operational state of the first switch management module using the first software version and storing the packet forwarding and protocol state information received from the first switch management module and operating the second switch management module without performing packet forwarding or participating in network protocols;

(c)   storing a second software version in memory;

(d)   rebooting the second switch management module using the second software version;

(e)   distributing protocol state and packet forwarding information from the first switch management module executing the first software version to the second switch management module executing the second software version; and

(f)   at the second switch management module, switching from operating in the slave mode to the master mode, wherein operating in the master mode includes injecting the protocol state and packet forwarding information received from the first switch management module into one or more subsystems of the second switch management module associated with performing packet forwarding and participating in network protocols and

starting packet forwarding and network protocol operations using the protocol state and packet forwarding information received from the first switch management module, thereby starting from the last correct network protocol operational state of the first switch management module.

25. (Currently Amended) A method for hitless software upgrade or downgrade in a switched network element, the method comprising:

(a) operating a first switch management module in the switched network element in a master mode, wherein operating in the master mode includes forwarding packets and participating in network protocols using a first software version;

(b) operating a second switch management module in a slave mode, wherein operating in the slave mode includes monitoring the operational state of the first switch management module using the first software version;

(c) storing a second software version in memory, wherein storing the second software version in memory associated with the second switch management module includes obtaining the second software version from a server and storing the second software version in memory associated with the second switch management module;

(d) rebooting the second switch management module using the second software version;

(f) distributing protocol state and packet forwarding information from the first switch management module executing the first software version to the

second switch management module executing the second software version; and

(g)   at the second switch management module, switching from operating in the slave mode to the master mode, wherein operating in the master mode includes injecting the protocol state and packet forwarding information received from the first switch management module into one or more subsystems of the second switch management module associated with performing packet forwarding and participating in network protocols and starting packet forwarding and network protocol operations using the protocol state and packet forwarding information received from the first switch management module, thereby starting from the last correct network protocol operational state of the first switch management module.

26.   (Currently Amended) A method for hitless software upgrade or downgrade in a switched network element, the method comprising:

(a)   operating a first switch management module in the switched network element in a master mode, wherein operating in the master mode includes forwarding packets and participating in network protocols using a first software version;

(b)   operating a second switch management module in a slave mode, wherein operating in the slave mode includes monitoring the operational state of the first switch management module using the first software version;

(c)   storing a second software version in memory;

(d)   rebooting the second switch management module using the second software version wherein rebooting the second switch management module includes performing a soft reboot of the second switch management module wherein software is reset, but hardware is not;

(e)   distributing protocol state and packet forwarding information from the first switch management module executing the first software version to the second switch management module executing the second software version; and

(f)   at the second switch management module, switching from operating in the slave mode to the master mode, wherein operating in the master mode includes <u>injecting the protocol state and packet forwarding information received from the first switch management module into one or more subsystems of the second switch management module associated with performing packet forwarding and participating in network protocols and</u> starting packet forwarding and network protocol operations using the protocol state and packet forwarding information received from the first switch management module, thereby starting from the last correct network protocol operational state of the first switch management module.

27.   (Previously Presented) A method for hitless software upgrade or downgrade in a switched network element, the method comprising:

(a)   operating a first switch management module in the switched network element in a master mode, wherein operating in the master mode includes

forwarding packets and participating in network protocols using a first software version;

(b) operating a second switch management module in a slave mode, wherein operating in the slave mode includes monitoring the operational state of the first switch management module using the first software version;

(c) storing a second software version in memory;

(d) rebooting the second switch management module using the second software version;

(e) distributing protocol state and packet forwarding information from the first switch management module executing the first software version to the second switch management module executing the second software version using canonical messages; and

(f) at the second switch management module, switching from operating in the slave mode to the master mode, wherein operating in the master mode includes starting packet forwarding and network protocol operations using the protocol state and packet forwarding information received from the first switch management module, thereby starting from the last correct network protocol operational state of the first switch management module.

28. (Original) The method of claim 27 comprising, at the second switch management module, updating fields in data structures that correspond to fields in data structures at the first switch management module based on the canonical messages.

29.   (Currently Amended) The method of claim 28 comprising, at the second switch management module, ~~comprising,~~ setting fields in the data structures that do not correspond to fields in data structures at the first switch management module to default values.

30.   (Currently Amended) A method for hitless software upgrade or downgrade in a switched network element, the method comprising:

(a)   operating a first switch management module in the switched network element in a master mode, wherein operating in the master mode includes forwarding packets and participating in network protocols using a first software version;

(b)   operating a second switch management module in a slave mode, wherein operating in the slave mode includes monitoring the operational state of the first switch management module using the first software version;

(c)   storing a second software version in memory;

(d)   rebooting the second switch management module using the second software version;

(e)   distributing protocol state and packet forwarding information from the first switch management module executing the first software version to the second switch management module executing the second software version using bracketing to group related message from the first switch management module to the second switch management module together in a single atomic transaction, wherein using bracketing to group related

messages together includes grouping all messages received between an open bracket and a closed bracket as part of a single transaction; and

(f)   at the second switch management module, switching from operating in the slave mode to the master mode, wherein operating in the master mode includes starting packet forwarding and network protocol operations using the protocol state and packet forwarding information received from the first switch management module, thereby starting from the last correct network protocol operational state of the first switch management module.

31.   (Original) The method of claim 30 wherein using bracketing comprises, at the second switch management module, grouping messages received between a start bracket and an end bracket together and using the messages to update protocol state information and discarding messages received after a start bracket in response to failing to receive an end bracket.

32.   (Currently Amended) A method for hitless software upgrade or downgrade in a switched network element, the method comprising:

(a)   operating a first switch management module in the switched network element in a master mode, wherein operating in the master mode includes forwarding packets and participating in network protocols using a first software version;

(b)   operating a second switch management module in a slave mode, wherein operating in the slave mode includes monitoring the operational state of the first switch management module using the first software version;

(c)   storing a second software version in memory wherein the first software version is newer than the second software version;

(d)   rebooting the second switch management module using the second software version;

(e)   distributing protocol state and packet forwarding information from the first switch management module executing the first software version to the second switch management module executing the second software version; and

(f)   at the second switch management module, switching from operating in the slave mode to the master mode, wherein operating in the master mode includes <u>injecting the protocol state and packet forwarding information received from the first switch management module into one or more subsystems of the second switch management module associated with performing packet forwarding and participating in network protocols and</u> starting packet forwarding and network protocol operations using the protocol state and packet forwarding information received from the first switch management module, thereby starting from the last correct network protocol operational state of the first switch management module.

33.   (Currently Amended) A method for hitless software upgrade or downgrade in a switched network element, the method comprising:

(a)   operating a first switch management module in the switched network element in a master mode, wherein operating in the master mode includes

forwarding packets and participating in network protocols using a first
software version;

(b)   operating a second switch management module in a slave mode, wherein
operating in the slave mode includes monitoring the operational state of
the first switch management module using the first software version;

(c)   storing a second software version in memory wherein the first software
version is older than the second software version;

(d)   rebooting the second switch management module using the second
software version;

(e)   distributing protocol state and packet forwarding information from the first
switch management module executing the first software version to the
second switch management module executing the second software
version; and

(f)   at the second switch management module, switching from operating in the
slave mode to the master mode, wherein operating in the master mode
includes injecting the protocol state and packet forwarding information
received from the first switch management module into one or more
subsystems of the second switch management module associated with
performing packet forwarding and participating in network protocols and
starting packet forwarding and network protocol operations using the
protocol state and packet forwarding information received from the first

switch management module, thereby starting from the last correct network protocol operational state of the first switch management module.

34.   (Currently Amended) A system for hitless switch management module failover, the system comprising:

(a)   a first switch management module for initially operating in a master mode, for managing the programming of hardware forwarding tables in a switched network element, for participating in network protocols, and for distributing protocol state, switch configuration, and packet forwarding information to a second switch management module; and

(b)   a second switch management module for operating in a slave mode, for storing the packet forwarding, switch configuration, and protocol state information received from the first switch management module, for monitoring the operational state of the first switch management module, and for, in response to failure of the first switch management module, switching to operate in the master mode in a last correct network protocol operational state of the first switch management module based on by injecting the received packet forwarding and protocol state information into one or more subsystems of the second switch management module associated with performing packet forwarding and participating in network protocols.

35.   (Original) The system of claim 34 wherein the first switch management module is adapted to store layer 2 protocol state information and to periodically distribute the layer 2 protocol state information to the second switch management module.

36.   (Original) The system of claim 35 wherein the layer 2 protocol state information includes spanning tree protocol state information.

37.   (Currently Amended) A system for hitless switch management module failover, the system comprising:

(a)   a first switch management module for initially operating in a master mode, for managing the programming of hardware forwarding tables in a switched network element, for participating in network protocols, and for distributing protocol state, switch configuration, and packet forwarding information to a second switch management module wherein the first switch management module is adapted to communicate the protocol state and packet forwarding information to the slave switch management module using canonical messages, wherein the canonical message format is a message format that corresponds to message type and length rules stored by the master and slave switch management modules; and

(b)   a second switch management module for operating in a slave mode, for storing the packet forwarding, switch configuration, and protocol state information received from the first switch management module, for monitoring the operational state of the first switch management module, and for, in response to failure of the first switch management module,

switching to operate in the master mode in a last correct network protocol operational state of the first switch management module based on the received protocol state and packet forwarding information.

38. (Original) The system of claim 37 wherein first and second switch management modules includes at least one corresponding data structure with different fields, wherein the second switch management module is adapted to use data received via a canonical message to update fields in its data structure that correspond to fields in the data structure maintained by the first switch management module.

39. (Original) The system of claim 38 wherein the second switch management module is adapted to set fields in its data structure that do not correspond to fields in the data structure maintained by the first switch management module to default values.

40. (Currently Amended) A system for hitless switch management module failover, the system comprising:

(a) a first switch management module for initially operating in a master mode, for managing the programming of hardware forwarding tables in a switched network element, for participating in network protocols, and for distributing protocol state, switch configuration, and packet forwarding information to a second switch management module wherein the first switch management module is adapted to use a bracketing mechanism to transfer related messages as atomic units to the second switch management module, wherein the bracketing mechanism is configured to

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<u>group all messages received between an open bracket and a closed</u>

<u>bracket as part of a single transaction</u>; and

(b)   a second switch management module for operating in a slave mode, for storing the packet forwarding, switch configuration, and protocol state information received from the first switch management module, for monitoring the operational state of the first switch management module, and for, in response to failure of the first switch management module, switching to operate in the master mode in a last correct network protocol operational state of the first switch management module based on the received protocol state and packet forwarding information.

41.   (Original) The system of claim 40 wherein the first switch management module is adapted to send an open bracket indicator to the second switch management module to initiate transfer of message containing related information.

42.   (Original) The system of claim 41 wherein the second switch management module is adapted to discard messages received after the open bracket indicator if a close bracket indicator is not received.

43.   (Original) The system of 42 wherein the second switch management module is adapted to process messages received after the open bracket indicator and to update the corresponding protocol state information in response to receiving the close bracket indicator within the predetermined time period.

44.   (Currently Amended) A system for hitless switch management module failover, the system comprising:

(a) a first switch management module for initially operating in a master mode, for managing the programming of hardware forwarding tables in a switched network element, for participating in network protocols, and for distributing protocol state, switch configuration, and packet forwarding information to a second switch management module;

(b) a second switch management module for operating in a slave mode, for storing the packet forwarding, switch configuration, and protocol state information received from the first switch management module, for monitoring the operational state of the first switch management module, and for, in response to failure of the first switch management module, switching to operate in the master mode in a last correct network protocol operational state of the first switch management module ~~based on~~ <u>by injecting</u> the received protocol state and packet forwarding information <u>into one or more subsystems of the second switch management module associated with performing packet forwarding and participating in network protocols</u>; and

(c) a user interface operatively associated with at least one of the first and second switch management modules for allowing a user to manually initiate a failover from the first switch management module to the second switch management module.